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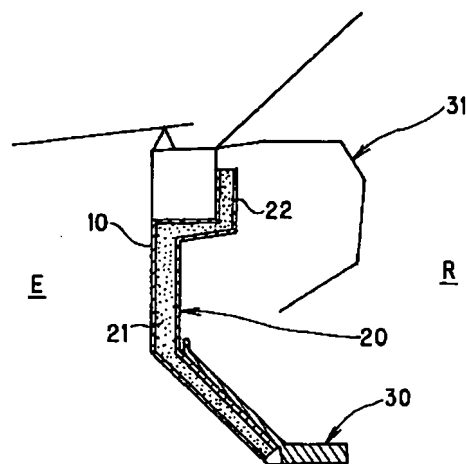
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(54) 【発明の名称】 自動車用インシュレータ

(57) 【要約】

【課題】 車体パネルの室内面側に添装される自動車用インシュレータであって、製品の軽量化を可能にするとともに、吸音性能を高める。

【解決手段】 ダッシュパネル10の面形状に即して形成された繊維質成形体からなる吸音層21と、吸音層21の表面に積層される発泡材をベースとした表皮層22とから構成され、発泡材をベースとすることで軽量化を図り、車体への取付作業性を高めるとともに、非通気性の発泡材を使用することで、表皮層の膜振動吸音機能により、低・中周波数域の騒音レベルを有効に吸音するとともに、通気性を可変させた発泡材を使用することで、中・高周波数域の騒音レベルを有効に吸音できるなど、発泡材の通気抵抗を可変することにより、吸音する騒音の周波数域に対応した吸音処理を可能にする。



- 10 ダッシュパネル
- 20 自動車用インシュレータダッシュ
- 21 吸音層(繊維質成形体)
- 22 表皮層(発泡材)
- 30 フロアカーペット
- 31 インストルメントパネル
- E エンジンルーム
- R 車室

## 【特許請求の範囲】

【請求項1】 音源ルーム（E）と車室（R）とを区画する車体パネル（10）の車室面側に装着される自動車用インシュレータ（20）であって、車体パネル（10）の面形状に沿って成形された繊維集合体からなる吸音層（21）と、該吸音層（21）の表面に一体化される発泡材からなる表皮層（22）との積層体から構成されることを特徴とする自動車用インシュレータ。

【請求項2】 表皮層（22）を構成する発泡材は、非通気構造であり、音源ルーム（E）側から車体パネル（10）を透過する透過騒音を表皮層（22）の膜振動により吸音することで低・中周波数域の騒音レベルを低減させることを特徴とする請求項1に記載の自動車用インシュレータ。

【請求項3】 表皮層（22）を構成する発泡材は、通気構造であり、通気抵抗を可変させることにより、表皮層（22）の膜振動による低・中周波数域レベルの吸音機能に加えて、中・高周波数域レベルの吸音機能をもたせ、吸音対象となる騒音の周波数域のチューニングを可能にしたことを特徴とする請求項1に記載の自動車用インシュレータ。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】この発明は、車体パネルの室内面側に装着される自動車用インシュレータに係り、特に、表皮層の軽量化を図るとともに、表皮層における通気構造及び非通気構造に着目して、吸音する騒音の周波数域を制御できるようにした自動車用インシュレータに関する。

## 【0002】

【従来の技術】通常、図2に示すように、エンジンルームEと車室Rとを区画するダッシュパネル1の室内面側には、インシュレータダッシュ2が装着されており、このインシュレータダッシュ2は、図3に示すように、再生ゴムシート、再生塩ビシート等、高密度材料からなる遮音層3と、その裏面側に積層一体化されるフェルト、ポリエステル繊維不織布等の繊維集合体からなる吸音層4とから構成されている。

【0003】また、インシュレータダッシュ2の下側表面には、フロアカーペット5がラップ状に敷設され、更に、インシュレータダッシュ2の上部側は、インストルメントパネル6内に位置している。

【0004】そして、従来の二層構造のインシュレータダッシュ2の防音メカニズムは、エンジンルームE内でのエンジン類や補機類の騒音は、ダッシュパネル1で一部が遮音され、ダッシュパネル1を透過して室内側に伝播する透過騒音は、吸音層4内で吸音されるとともに、遮音層3による二重壁遮音機能により、所望の防音性能が得られる。

【0005】そして、遮音層3としては、面密度が約2

～10kg/m<sup>2</sup> の範囲にある重量化を伴う素材を使用しているため、製品重量は約2～12kgとなっている。

## 【0006】

【発明が解決しようとする課題】このように、従来のインシュレータダッシュ2は、高密度材料を素材とした遮音層3と、繊維集合体からなる吸音層4との二層積層体から構成されており、特に遮音層3の重量が高いため、製品をダッシュパネル1に取り付ける際の取付作業性が悪化するとともに、重量化が原因となり、燃費効率の悪さに悪影響を及ぼすという欠点が指摘されている。

【0007】更に、従来のインシュレータダッシュ2の防音メカニズムは、インシュレータダッシュ2の主に二重壁遮音機能による遮音・吸音機能に依存しているため、インストルメントパネル6内での吸音機能が小さく、ターゲットとする騒音の周波数域が限定され、低周波数域から高周波数域における幅広い周波数域の騒音に対して必ずしも有効とはいえなかった。

【0008】この発明は、このような事情に鑑みてなされたもので、車体パネルの室内面側に装着される自動車用インシュレータであって、特に、重量が高まる遮音層を廃止して、軽量化を促進させるとともに、所望の防音性能が得られる自動車用インシュレータを提供することを目的としている。

## 【0009】

【課題を解決するための手段】上記目的を達成するために、本願の請求項1に記載の発明は、音源ルームと車室とを区画する車体パネルの車室面側に装着される自動車用インシュレータであって、車体パネルの面形状に沿って成形された繊維集合体からなる吸音層と、該吸音層の表面に一体化される発泡材からなる表皮層との積層体から構成されることを特徴とする。

【0010】ここで、吸音層の材質は、フェルト、PET（ポリエチレンテレフタレート）に代表されるポリエステル繊維、不織布、木、紙類（パルプ等）を繊維状にした繊維集合体からなり、0.03～3.0kg/m<sup>2</sup> の面密度であり、周波数域630～4000Hzの平均吸音率が厚み20mm時で30～90%に調整された材料を使用する。

【0011】また、表皮層としての発泡材は、オレフィン系、EPDM等の多孔性物質を使用する。材質としては、ポリプロピレン、ポリウレタン、ポリエチレン、ポリエステル等の合成樹脂が使用でき、面密度は0.05～0.3kg/m<sup>2</sup> の範囲が適しており、厚みとしては、1～15mmの範囲が良く、一部又は全体に設定する。

【0012】そして、請求項1に記載の発明によれば、表皮層は、軽量の発泡材から構成されるため、製品の軽量化が可能となるとともに、表皮層により吸音層からの繊維のほつれ、脱落を抑えることができる。

【0013】この出願の請求項2に記載の発明は、表皮層を構成する発泡材は、非通気構造であり、音源ルーム側から車体パネルを透過する透過騒音を表皮層の膜振動により吸音することで低・中周波数域の騒音レベルを低減させることを特徴とする。

【0014】そして、請求項2に記載の発明によれば、表皮層を構成する発泡材は非通気構造であるため、この表皮層の膜振動により低・中周波数域（500～2500Hz）の騒音を有効に吸音することができる。

【0015】この出願の請求項3に記載の発明は、表皮層を構成する発泡材は、通気構造であり、通気抵抗を可変させることにより、表皮層の膜振動による低・中周波数域レベルの吸音機能に加えて、中・高周波数域レベルの吸音機能をもたせ、吸音対象となる騒音の周波数域のチューニングを可能にしたことを特徴とする。

【0016】そして、請求項3に記載の発明によれば、表皮層の素材である発泡材は、通気性の全くない状態から通気性を増加させることにより、発泡材の膜振動による低・中周波数域（500～2500Hz）を吸音する吸音機能に加えて、中・高周波数域（800～4000Hz）の騒音を吸音する多孔質吸音機能を達成できるため、狙いの周波数域のチューニングが可能となる。

【0017】

【発明の実施の形態】以下、本発明に係る自動車用インシュレータを自動車用インシュレータダッシュに適用した実施の形態について、添付図面を参照しながら詳細に説明する。

【0018】図1において、エンジンルームEと車室Rとを区画するダッシュパネル10の室内面側に装着される自動車用インシュレータダッシュ20は、ダッシュパネル10の面形状に即して所要形状に成形される吸音層21と、吸音層21の表面に積層される表皮層22とから大略構成されている。

【0019】更に詳しくは、吸音層21は、所望の多孔質吸音機能を備えていれば良いため、例えば、フェルト、PET（ポリエチレンテレフタレート）に代表されるポリエステル繊維、紙類（パルプ等）を繊維状にした繊維集合体からなり、本実施形態では、ベースとなるポリエステル繊維中にバインダとなる熱融着繊維を混合して、繊維マットを形成し、熱風加熱炉により加熱軟化した後、コールドプレス成形することにより、厚肉部、薄肉部等、適宜厚みを可変させ、所望形状の吸音層21が成形されている。そして、この吸音層21の面密度は、 $0.03 \sim 3.0 \text{ kg/m}^2$  に調整されている。

【0020】一方、表皮層22は、従来の重量の嵩む高密度の遮音層の代わりに、ポリオレフィン系樹脂、EPDM等の多孔性物質（発泡材）を使用しており、ポリプロピレン、ポリウレタン、ポリエチレン、ポリエステル等の合成樹脂の使用が可能である。

【0021】表皮層22の面密度は、特に限定しない

が、例えば、 $0.05 \sim 0.3 \text{ kg/m}^2$  が適切であり、厚みとしては1～15mmのものを吸音層21の全面、あるいは一部に貼着するという構成である。

【0022】尚、インシュレータダッシュ20の下部側表面には、フロアカーペット30がラップ状に敷設され、更にインシュレータダッシュ20の上部側は、インストルメントパネル31が配置されている。

【0023】このように、本発明を適用した自動車用インシュレータダッシュ20は、従来の重量の嵩む遮音層に替えて、発泡材をベースとした軽量の表皮層22を採用したため、軽量化を図ることができ、車両の燃費効率を向上させることができるとともに、ダッシュパネル10に取り付ける際の取付作業を円滑に行なうことができ、取付作業性を向上させることができるという利点がある。

【0024】更に、発泡材を使用する表皮層22のバリエーションにより、吸音性能の向上を図ることも可能となる。すなわち、表皮層22として、独立発泡体からなる非通気性の発泡材を使用した場合には、ダッシュパネル10を通じて車室R内に透過する透過騒音は、吸音層21でその一部がエネルギー減衰されるとともに、表皮層22が非通気性発泡構造であるため、表皮層22の膜振動により、特に、低・中周波数域（500～2500Hz）の騒音を有効に吸音することができる。

【0025】逆に、表皮層22として、連続気泡型の発泡材を使用し、通気性を調整することにより、非通気性発泡材を使用した膜振動による低・中周波数域（500～2500Hz）の吸音機能に加えて、多孔質吸音機能による中・高周波数域（800～4000Hz）の周波数域の騒音を有効に吸音することができる。

【0026】従って、発泡材を使用した表皮層22の通気性を調整することにより、ターゲットとなる騒音の周波数域をチューニングする作業が簡単に行なえる。

【0027】また、表皮層22として発泡材をベースとして使用した場合、インシュレータダッシュ20を通して車室内側に伝播する騒音はインストルメントパネル31内で反射した後、再度表皮層22を通して自動車用インシュレータダッシュ20内に進入して、吸音されるため、車室内の騒音レベルを低減することも可能となり、このことも車室内の吸音性能の向上に繋がる。

【0028】尚、本発明は、上述した自動車用インシュレータダッシュ20に限定されるものではなく、車体パネルに装着される自動車用インシュレータ全般に適用できる。

【0029】

【発明の効果】以上説明した通り、本発明に係る自動車用インシュレータは、表皮層の構成として発泡材を使用することにより、軽量化を図ることで製品の軽量化が可能となることから、車両の燃費効率を高めるとともに、車体パネルへの取付作業性を向上させることができると

いう効果を有する。

【0030】更に、発泡材をベースとした表皮層を非通気構造とすることで表皮層の膜振動吸音機能により、低・中周波数域の騒音レベルを有効に吸音できる一方、表皮層を非通気構造から通気性構造に替えるとともに、通気抵抗を可変させることで、中・高周波数域の騒音レベルを有効に吸音できるなど、狙いの周波数域のチューニング作業が簡素化でき、バランスの良い吸音性能を達成することができるという効果を有する。

【図面の簡単な説明】

【図1】本発明に係る自動車用インシュレータの一実施形態である自動車用インシュレータダッシュの構成を示す説明図である。

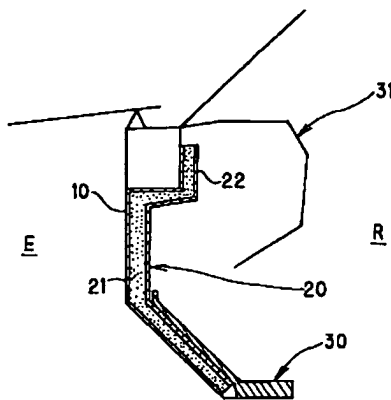
\*【図2】自動車用インシュレータダッシュの設置箇所を示す説明図である。

【図3】従来の自動車用インシュレータダッシュの構成を示す説明図である。

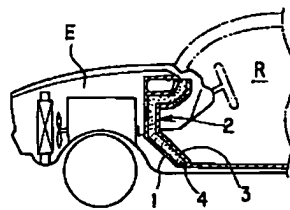
【符号の説明】

- 10 ダッシュパネル
- 20 自動車用インシュレータダッシュ
- 21 吸音層（繊維質成形体）
- 22 表皮層（発泡材）
- 10 30 フロアカーペット
- 31 インストルメントパネル
- E エンジンルーム
- \* R 車室

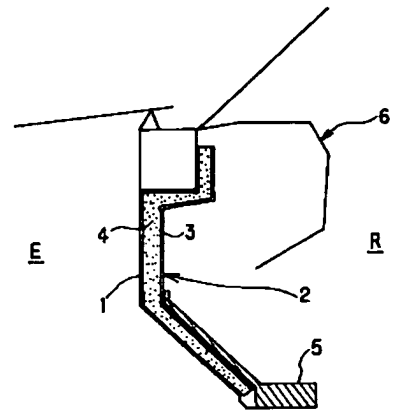
【図1】



【図2】



【図3】



- 10 ダッシュパネル
- 20 自動車用インシュレータダッシュ
- 21 吸音層（繊維質成形体）
- 22 表皮層（発泡材）
- 30 フロアカーペット
- 31 インストルメントパネル
- E エンジンルーム
- R 車室

フロントページの続き

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JH01A JL02 JL03  
5D061 AA26 BB37

## CLAIMS

2003. 08/028

### [Claim(s)]

[Claim 1] The absorption-of-sound layer which consists of the fiber aggregate which is the insulator for automobiles (20) with which the \*\*\*\*\* side of the car-body panel (10) which divides a sound-source room (E) and a vehicle room (R) is equipped, and was fabricated in accordance with the field configuration of a car-body panel (10) (21), The insulator for automobiles characterized by consisting of layered products with the epidermis layer (22) which consists of foam united with the front face of this absorption-of-sound layer (21).

[Claim 2] The foam which constitutes an epidermis layer (22) is an insulator for automobiles according to claim 1 characterized by reducing the noise level of low and an inside frequency region by absorbing sound the transparency noise which is non-aeration structure and penetrates the sound-source (room E) side empty vehicle object panel (10) by film vibration of an epidermis layer (22).

[Claim 3] the foam which constitute an epidermis layer (22) be an insulator for automobiles according to claim 1 which be aeration structure and be characterize by to enable a tuning of the frequency region of the noise which give the absorption of sound function of inside and high frequency region level, and serve as a candidate for absorption of sound by carry out adjustable [ of the ventilation resistance ] in addition to the absorption of sound function of the low and the inside frequency region level by film vibration of an epidermis layer (22).

## DETAILED DESCRIPTION

### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the insulator for automobiles which enabled it to control the frequency region of the noise which absorbs sound paying attention to the aeration structure and non-aeration structure in an epidermis layer while it relates to the insulator for automobiles with which the indoor side side of a car-body panel is equipped and attains lightweight-ization of an epidermis layer especially.

[0002]

[Description of the Prior Art] Usually, as shown in drawing 2, the indoor side side of the dash panel 1 which divides an engine room E and the vehicle room R is equipped with the insulator dash 2, and this insulator dash 2 consists of a noise-insulation layer 3 which consists of high density ingredients, such as a playback rubber sheet and a playback vinyl chloride sheet, and an absorption-of-sound layer 4 which consists of the fiber aggregates by which laminating unification is carried out at that rear-face side, such as felt and a polyester fiber nonwoven fabric, as shown in drawing 3.

[0003] Moreover, the floor carpet 5 is laid by the bottom front face of the insulator dash 2 in the shape of a lap, and the upper part side of the insulator dash 2 is further located in an instrument panel 6.

[0004] And a part insulates the noise of the engines in an engine room E, and auxiliary machinery for the sound isolation mechanism of the insulator dash 2 of the conventional two-layer structure with a dash panel 1, and while the transparency noise which penetrates a dash panel 1 and is spread to an interior-of-a-room side absorbs sound within the absorption-of-sound layer 4, the desired sound isolation engine performance is obtained by the double-wall noise insulation function by the noise insulation layer 3.

[0005] And as a noise insulation layer 3, surface density is about 2-10kg/m<sup>2</sup>. Since the material accompanied by weight-izing in the range is used, product weight is about 2-12kg.

[0006]

[Problem(s) to be Solved by the Invention] Thus, since the conventional insulator dash 2 consists of bilayer layered products of the noise insulation layer 3 made from the high density ingredient, and the absorption-of-sound layer 4 which consists of the fiber aggregate and especially the weight of the noise insulation layer 3 increases, while the attachment workability at the time of attach a product in a dash panel 1 gets worse, weight-ization becomes a cause and the fault of have a bad influence on the badness of fuel consumption effectiveness is point out.

[0007] Furthermore, since it was dependent on the Lord of the insulator dash 2 at noise insulation / absorption-of-sound function by the double-wall noise insulation function, the sound isolation mechanism of the conventional insulator dash 2 had the small absorption-of-sound function within an

instrument panel 6, and the frequency region of the noise used as a target was limited, and it was not necessarily able to say that it was effective from a low frequency region to the noise of the broad frequency region in a high-frequency region.

[0008] It aims at offering the insulator for automobiles with which the desired sound isolation engine performance is obtained while this invention was made in view of such a situation, abolishes the noise insulation layer in which it is the insulator for automobiles with which the indoor side side of a car-body panel is equipped, and weight increases especially and promotes lightweight-ization.

[0009]

[Means for Solving the Problem] in order to attain the above-mentioned purpose, invention of this application according to claim 1 be an insulator for automobiles with which the \*\*\*\*\* side of the car body panel which divide a sound source room and a vehicle room be equip, and it be characterize by to consist of layered products of the absorption of sound layer which consist of the fiber aggregate fabricated in accordance with the field configuration of a car body panel, and the epidermis layer which consist of foam unite with the front face of this absorption of sound layer.

[0010] Here, the quality of the material of an absorption-of-sound layer consists of felt, the polyester fiber represented by PET (polyethylene terephthalate), a nonwoven fabric, a tree, and the fiber aggregate that made papers (pulp etc.) fibrous, and is 0.03 - 3.0 kg/m<sup>2</sup>. It is surface density and the average sound absorption coefficient of 630-4000Hz of frequency regions uses the ingredient adjusted to 30 - 90% in thickness the o'clock of 20mm.

[0011] Moreover, the foam as an epidermis layer uses porous matter, such as an olefin system and EPDM. As the quality of the material, synthetic resin, such as polypropylene, polyurethane, polyethylene, and polyester, can be used, and surface density is 0.05-0.3kg/m<sup>2</sup>. The range is suitable, and as thickness, the range of 1-15mm is good, and sets it as a part or the whole.

[0012] And since an epidermis layer consists of lightweight foam and is, while lightweight-ization of a product is attained according to invention according to claim 1, a fray of the fiber from an absorption-of-sound layer and omission can be suppressed by the epidermis layer.

[0013] The foam from which invention of this application according to claim 2 constitutes an epidermis layer is non-aeration structure, and is characterized by

reducing the noise level of low and an inside frequency region by absorbing sound the transparency noise which penetrates a sound-source room side empty vehicle object panel by film vibration of an epidermis layer.

[0014] And according to invention according to claim 2, since the foam which constitutes an epidermis layer is non-aeration structure, it can absorb sound effectively the noise of low and an inside frequency region (500-2500Hz) by film vibration of this epidermis layer.

[0015] The foam from which invention of this application according to claim 3 constitutes an epidermis layer is aeration structure, by carrying out adjustable [ of the ventilation resistance ], in addition to the absorption of sound function of the low and inside frequency region level by film vibration of an epidermis layer, gives the absorption of sound function of inside and high frequency region level, and is characterize by to enable tuning of the frequency region of the noise used as the candidate for absorption of sound.

[0016] According to invention according to claim 3, and the foam which is a material of an epidermis layer By making permeability increase from a condition without permeability, low and the inside frequency region by film vibration of foam (500-2500Hz) are added to the absorption-of-sound function which absorbs sound. Since the porosity absorption-of-sound function which absorbs sound the noise of inside and a high-frequency region (800-4000Hz) can be attained, it becomes tunable [ the frequency region of an aim ].

[0017]

[Embodiment of the Invention] The gestalt of the operation which applied the insulator for automobiles concerning this invention to the insulator dash for automobiles hereafter is explained to a detail, referring to an accompanying drawing.

[0018] In drawing 1 , the profile configuration of the insulator dash 20 for automobiles with which the indoor side side of the dash panel 10 which divides an engine room E and the vehicle room R is equipped is carried out from the absorption-of-sound layer 21 which is based on the field configuration of a dash panel 10, and is fabricated by the necessary configuration, and the epidermis layer 22 by which a laminating is carried out to the front face of the absorption-of-sound layer 21.

[0019] Furthermore, since the absorption-of-sound layer 21 should just be equipped with the desired porosity absorption-of-sound function in detail, It consists of felt, polyester fiber represented by PET (polyethylene terephthalate), and the fiber aggregate which made papers (pulp etc.) fibrous. For example, with this operation gestalt After mixing the thermal melting arrival fiber used as a binder, forming a fiber



mat into the polyester fiber used as the base and carrying out heating softening with a hot blast heating furnace, by carrying out cold press molding, a heavy-gage part, a thin-walled part, etc. carry out adjustable [ of the thickness ] suitably, and the absorption-of-sound layer 21 of a request configuration is fabricated. And the surface density of this absorption-of-sound layer 21 is 0.03 - 3.0 kg/m<sup>2</sup>. It is adjusted.

[0020] On the other hand, porous matter (foam), such as polyolefine system resin and EPDM, is being used for the epidermis layer 22 instead of the noise insulation layer of the high density to which the conventional weight increases, and use of synthetic resin, such as polypropylene, polyurethane, polyethylene, and polyester, is possible.

[0021] Especially the surface density of the epidermis layer 22 is 0.05 - 0.3 kg/m<sup>2</sup>, for example, although not limited. It is the configuration of it being suitable and sticking a 1-15mm thing on the whole surface of the absorption-of-sound layer 21, or a part as thickness.

[0022] In addition, the floor carpet 30 is laid by the lower part side front face of the insulator dash 20 in the shape of a lap, and, as for the upper part side of the insulator dash 20, the instrument panel 31 is further arranged on it.

[0023] Thus, the insulator dash 20 for automobiles which applied this invention can be changed to the noise insulation layer in which the conventional weight increases, can perform smoothly attachment at the time of attaching in a dash panel 10, while being able to attain lightweight-ization and being able to raise the fuel consumption effectiveness of a car, since the lightweight epidermis layer 22 which used foam as the base was adopted, and has the advantage that attachment workability can be raised.

[0024] Furthermore, it also becomes possible to aim at improvement in the absorption-of-sound engine performance by the variation of the epidermis layer 22 which uses foam. namely, when the foam of the non-permeability which consists of independent foam is used as an epidermis layer 22 The transparency noise penetrated in the vehicle room R through a dash panel 10 Since the epidermis layer 22 is non-permeability foaming structure while energy attenuation of the part is carried out in the absorption-of-sound layer 21, the noise of low and an inside frequency region (500-2500Hz) can be especially absorbed sound effectively by film vibration of the epidermis layer 22.

[0025] On the contrary, by using the foam of an open cell mold and adjusting permeability as an epidermis layer 22, in addition to the absorption-of-sound function of the low and the inside frequency region by film vibration which used non-permeability foam (500-2500Hz), while being based on a porosity absorption-of-sound function, the noise of the frequency region of - high-frequency region (800-4000Hz) can be absorbed

sound effectively.

[0026] Therefore, the activity which tunes up the frequency region of the noise used as a target can be easily done by adjusting the permeability of the epidermis layer 22 which used foam.

[0027] Moreover, in order that the noise spread to a vehicle interior-of-a-room side through the insulator dash 20 may advance into the insulator dash 20 for automobiles and may absorb sound through the epidermis layer 22 again after reflecting within an instrument panel 31 when foam is used as the base as an epidermis layer 22, it also becomes possible to reduce the noise level of the vehicle interior of a room, and this also leads to improvement in the absorption-of-sound engine performance of the vehicle interior of a room.

[0028] In addition, this invention is not limited to the insulator dash 20 for automobiles mentioned above, and can be applied to the insulator at large [ for automobiles ] with which a car-body panel is equipped.

[0029]

[Effect of the Invention] The insulator for automobiles concerning this invention has the effectiveness that the attachment workability to a car-body panel can be raised while raising the fuel consumption effectiveness of a car, since lightweight-ization of a product is attained by attaining lightweight-ization by using foam as a configuration of an epidermis layer, as explained above.

[0030] Furthermore, by making into non-aeration structure the epidermis layer which used foam as the base, by the film oscillating absorption-of-sound function of an epidermis layer, while the noise level of low and an inside frequency region can be absorbed sound effectively and changing an epidermis layer to permeability structure from non-aeration structure It has the effectiveness that the tuning activity of the frequency region of an aim can be simplified and that the noise level of inside and a high frequency region can be absorbed sound effectively etc. can attain the good absorption-of-sound engine performance of balance by carrying out adjustable [ of the ventilation resistance ].

## TECHNICAL FIELD

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[Field of the Invention] This invention relates to the insulator for automobiles which enabled it to control the frequency region of the noise which absorbs sound paying attention to the aeration structure and non-aeration structure in an epidermis layer while it relates to the insulator

for automobiles with which the indoor side side of a car-body panel is equipped and attains lightweight-ization of an epidermis layer especially.

## PRIOR ART

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[Description of the Prior Art] Usually, as shown in drawing 2 , the indoor side side of the dash panel 1 which divides an engine room E and the vehicle room R is equipped with the insulator dash 2, and this insulator dash 2 consists of a noise-insulation layer 3 which consists of high density ingredients, such as a playback rubber sheet and a playback vinyl chloride sheet, and an absorption-of-sound layer 4 which consists of the fiber aggregates by which laminating unification is carried out at that rear-face side, such as felt and a polyester fiber nonwoven fabric, as shown in drawing 3 .

[0003] Moreover, the floor carpet 5 is laid by the bottom front face of the insulator dash 2 in the shape of a lap, and the upper part side of the insulator dash 2 is further located in an instrument panel 6.

[0004] And a part insulates the noise of the engines in an engine room E, and auxiliary machinery for the sound isolation mechanism of the insulator dash 2 of the conventional two-layer structure with a dash panel 1, and while the transparency noise which penetrates a dash panel 1 and is spread to an interior-of-a-room side absorbs sound within the absorption-of-sound layer 4, the desired sound isolation engine performance is obtained by the double-wall noise insulation function by the noise insulation layer 3.

[0005] And as a noise insulation layer 3, surface density is about 2-10kg/m<sup>2</sup>. Since the material accompanied by weight-izing in the range is used, product weight is about 2-12kg.

## EFFECT OF THE INVENTION

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[Effect of the Invention] The insulator for automobiles concerning this invention has the effectiveness that the attachment workability to a car-body panel can be raised while raising the fuel consumption effectiveness of a car, since lightweight-ization of a product is attained by attaining lightweight-ization by using foam as a configuration of an epidermis layer, as explained above.

[0030] Furthermore, by making into non-aeration structure the epidermis layer which used foam as the base, by the film oscillating absorption-of-sound function of an epidermis layer, while the noise level of low and an inside frequency region can be absorbed sound effectively and changing an epidermis layer to permeability structure from non-aeration structure It has the effectiveness that the tuning activity of the frequency region of an aim can be simplified and that the noise level of inside and a high frequency region can be absorbed sound effectively etc. can attain the good absorption-of-sound engine performance of balance by carrying out adjustable [ of the ventilation resistance ].

## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] Thus, since the conventional insulator dash 2 consists of bilayer layered products of the noise insulation layer 3 made from the high density ingredient, and the absorption-of-sound layer 4 which consists of the fiber aggregate and especially the weight of the noise insulation layer 3 increases, while the attachment workability at the time of attach a product in a dash panel 1 gets worse, weight-ization becomes a cause and the fault of have a bad influence on the badness of fuel consumption effectiveness is point out.

[0007] Furthermore, since it was dependent on the Lord of the insulator dash 2 at noise insulation / absorption-of-sound function by the double-wall noise insulation function, the sound isolation mechanism of the conventional insulator dash 2 had the small absorption-of-sound function within an instrument panel 6, and the frequency region of the noise used as a target was limited, and it was not necessarily able to say that it was effective from a low frequency region to the noise of the broad frequency region in a high-frequency region.

[0008] It aims at offering the insulator for automobiles with which the desired sound isolation engine performance is obtained while this invention was made in view of such a situation, abolishes the noise insulation layer in which it is the insulator for automobiles with which the indoor side side of a car-body panel is equipped, and weight increases especially and promotes lightweight-ization.

## MEANS

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[Means for Solving the Problem] in order to attain the above-mentioned purpose, invention of this application according to claim 1 be an insulator for automobiles with which the \*\*\*\*\* side of the car body panel which divide a sound source room and a vehicle room be equip, and it be characterize by to consist of layered products of the absorption of sound layer which consist of the fiber aggregate fabricated in accordance with the field configuration of a car body panel, and the epidermis layer which consist of foam unite with the front face of this absorption of sound layer.

[0010] Here, the quality of the material of an absorption-of-sound layer consists of felt, the polyester fiber represented by PET (polyethylene terephthalate), a nonwoven fabric, a tree, and the fiber aggregate that made papers (pulp etc.) fibrous, and is 0.03 - 3.0 kg/m<sup>2</sup>. It is surface density and the average sound absorption coefficient of 630-4000Hz of frequency regions uses the ingredient adjusted to 30 - 90% in thickness the o'clock of 20mm.

[0011] Moreover, the foam as an epidermis layer uses porous matter, such as an olefin system and EPDM. As the quality of the material, synthetic resin, such as polypropylene, polyurethane, polyethylene, and polyester, can be used, and surface density is 0.05-0.3kg/m<sup>2</sup>. The range is suitable, and as thickness, the range of 1-15mm is good, and sets it as a part or the whole.

[0012] And since an epidermis layer consists of lightweight foam and is, while lightweight-ization of a product is attained according to invention according to claim 1, a fray of the fiber from an absorption-of-sound layer and omission can be suppressed by the epidermis layer.

[0013] The foam from which invention of this application according to claim 2 constitutes an epidermis layer is non-aeration structure, and is characterized by reducing the noise level of low and an inside frequency region by absorbing sound the transparency noise which penetrates a sound-source room side empty vehicle object panel by film vibration of an epidermis layer.

[0014] And according to invention according to claim 2, since the foam which constitutes an epidermis layer is non-aeration structure, it can absorb sound effectively the noise of low and an inside frequency region (500-2500Hz) by film vibration of this epidermis layer.

[0015] The foam from which invention of this application according to claim 3

constitutes an epidermis layer is aeration structure, by carrying out adjustable [ of the ventilation resistance ], in addition to the absorption of sound function of the low and inside frequency region level by film vibration of an epidermis layer, gives the absorption of sound function of inside and high frequency region level, and is characterized by to enable tuning of the frequency region of the noise used as the candidate for absorption of sound.

[0016] According to invention according to claim 3, and the foam which is a material of an epidermis layer By making permeability increase from a condition without permeability, low and the inside frequency region by film vibration of foam (500-2500Hz) are added to the absorption-of-sound function which absorbs sound. Since the porosity absorption-of-sound function which absorbs sound the noise of inside and a high-frequency region (800-4000Hz) can be attained, it becomes tunable [ the frequency region of an aim ]. [0017]

[Embodiment of the Invention] The gestalt of the operation which applied the insulator for automobiles concerning this invention to the insulator dash for automobiles hereafter is explained to a detail, referring to an accompanying drawing.

[0018] In drawing 1 , the profile configuration of the insulator dash 20 for automobiles with which the indoor side side of the dash panel 10 which divides an engine room E and the vehicle room R is equipped is carried out from the absorption-of-sound layer 21 which is based on the field configuration of a dash panel 10, and is fabricated by the necessary configuration, and the epidermis layer 22 by which a laminating is carried out to the front face of the absorption-of-sound layer 21.

[0019] Furthermore, since the absorption-of-sound layer 21 should just be equipped with the desired porosity absorption-of-sound function in detail, It consists of felt, polyester fiber represented by PET (polyethylene terephthalate), and the fiber aggregate which made papers (pulp etc.) fibrous. For example, with this operation gestalt After mixing the thermal melting arrival fiber used as a binder, forming a fiber mat into the polyester fiber used as the base and carrying out heating softening with a hot blast heating furnace, by carrying out cold press molding, a heavy-gage part, a thin-walled part, etc. carry out adjustable [ of the thickness ] suitably, and the absorption-of-sound layer 21 of a request configuration is fabricated. And the surface density of this absorption-of-sound layer 21 is 0.03 - 3.0 kg/m<sup>2</sup>. It is adjusted.

[0020] On the other hand, porous matter (foam), such as polyolefine system resin and EPDM, is being used for the epidermis layer 22 instead of the noise insulation layer of the high density to which the conventional weight increases, and use of synthetic resin,

such as polypropylene, polyurethane, polyethylene, and polyester, is possible.

[0021] Especially the surface density of the epidermis layer 22 is 0.05 - 0.3 kg/m<sup>2</sup>, for example, although not limited. It is the configuration of it being suitable and sticking a 1-15mm thing on the whole surface of the absorption-of-sound layer 21, or a part as thickness.

[0022] In addition, the floor carpet 30 is laid by the lower part side front face of the insulator dash 20 in the shape of a lap, and, as for the upper part side of the insulator dash 20, the instrument panel 31 is further arranged on it.

[0023] Thus, the insulator dash 20 for automobiles which applied this invention can be changed to the noise insulation layer in which the conventional weight increases, can perform smoothly attachment at the time of attaching in a dash panel 10, while being able to attain lightweight-ization and being able to raise the fuel consumption effectiveness of a car, since the lightweight epidermis layer 22 which used foam as the base was adopted, and has the advantage that attachment workability can be raised.

[0024] Furthermore, it also becomes possible to aim at improvement in the absorption-of-sound engine performance by the variation of the epidermis layer 22 which uses foam. namely, when the foam of the non-permeability which consists of independent foam is used as an epidermis layer 22 The transparency noise penetrated in the vehicle room R through a dash panel 10 Since the epidermis layer 22 is non-permeability foaming structure while energy attenuation of the part is carried out in the absorption-of-sound layer 21, the noise of low and an inside frequency region (500-2500Hz) can be especially absorbed sound effectively by film vibration of the epidermis layer 22.

[0025] On the contrary, by using the foam of an open cell mold and adjusting permeability as an epidermis layer 22, in addition to the absorption-of-sound function of the low and the inside frequency region by film vibration which used non-permeability foam (500-2500Hz), while being based on a porosity absorption-of-sound function, the noise of the frequency region of - high-frequency region (800-4000Hz) can be absorbed sound effectively.

[0026] Therefore, the activity which tunes up the frequency region of the noise used as a target can be easily done by adjusting the permeability of the epidermis layer 22 which used foam.

[0027] Moreover, in order that the noise spread to a vehicle interior-of-a-room side through the insulator dash 20 may advance into the insulator dash 20 for automobiles and may absorb sound through the epidermis layer 22 again after reflecting within an instrument panel 31 when foam is used as the base as an epidermis layer 22, it also

becomes possible to reduce the noise level of the vehicle interior of a room, and this also leads to improvement in the absorption-of-sound engine performance of the vehicle interior of a room.

[0028] In addition, this invention is not limited to the insulator dash 20 for automobiles mentioned above, and can be applied to the insulator at large [ for automobiles ] with which a car-body panel is equipped.

## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view showing the configuration of the insulator dash for automobiles which is 1 operation gestalt of the insulator for automobiles concerning this invention.

[Drawing 2] It is the explanatory view showing the installation part of the insulator dash for automobiles.

[Drawing 3] It is the explanatory view showing the configuration of the conventional insulator dash for automobiles.

[Description of Notations]

10 Dash Panel

20 Insulator Dash for Automobiles

21 Absorption-of-Sound Layer (Fiber Plastic Solid)

22 Epidermis Layer (Foam)

30 Floor Carpet

31 Instrument Panel

E Engine room

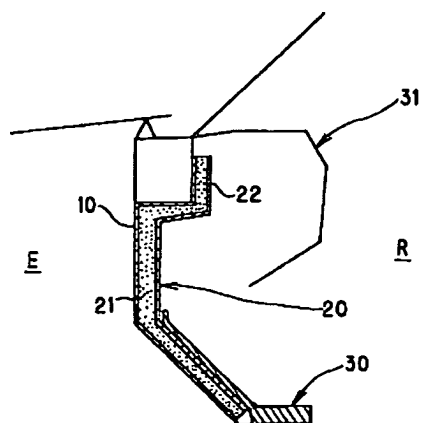
R Vehicle room

## DRAWINGS

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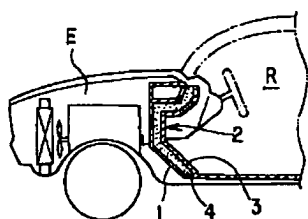
[Drawing 1]





- 10 ダッシュパネル
- 20 自動車用インシュレータダッシュ
- 21 吸音層(繊維質成形体)
- 22 表皮層(発泡材)
- 30 フロアカーペット
- 31 インストルメントパネル
- E エンジンルーム
- R 車室

[Drawing 2]



[Drawing 3]

